Generation Interconnection
Facility Study Report

For

PJM Generation Interconnection Request
Queue Position AC1-216

Hopewell - Surry 230kV
54.8 MW Capacity / 97.9 MW Energy

January 2020

General

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff §207, as well as the Facilities Study Agreement between Spring Grove Solar I, LLC, the Interconnection Customer (IC) and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company (VEPCO).

The IC has proposed a solar generating facility located in Surry County, VA. The installed facilities will have a total capability of 97.9 MW with 54.8 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is 10/01/2020. **This study does not imply an ITO commitment to this in-service date.**

Point of Interconnection

AC1-216 will interconnect with the ITO transmission system will connect via a new ringbus bay in switching station to be built for the AB2-134 (Colonial Trail substation) queue project that connects on the Hopewell - Surry 230kV line # 212.

Cost Summary

The AC1-216 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$611,387
Direct Connection Network Upgrades	$0
Non Direct Connection Network Upgrades	$619,967
Allocation for New System Upgrades	$0
Contribution for Previously Identified Upgrades	$0
Total Costs	**$1,231,354**

A. Transmission Owner Facilities Study Summary

1. Description of Project

Queue AC1-216 is a request to interconnect a 97.9 MW solar generating facility located in Surry County, Virginia. The scope of the project AC1-216 includes necessary network upgrades and attachment facilities to connect the generation to the Dominion transmission network. Attachment Facility and Network upgrade construction is estimated to be 4 - 8 months.

2. Amendments to the System Impact Study data or System Impact Study Results

None

3. Interconnection Customer's Submitted Milestone Schedule

- Plan to break ground July 1, 2019
- Permits – state level Permit By Rule and county level Final Site Plan approval complete July 1, 2019
- Substantial site work completed June 1, 2020
- Delivery of major electrical equipment August 1, 2020
- Back Feed Power November 30, 2019
- Commercial Operation October 1, 2020

4. Scope of Customer's Work

IC will build a solar generating facility in Surry County, Virginia. The generating facility (Spring Grove 1 Solar) will be comprised of 39 2.57 MW, TMEIC-PVH-L2700GR Solar PV Inverters, 39 34.5/0.6kV 2,700 kVA step up transformers and a 34.5kV capacitor bank of 27 MVAR. The generating facility will connect to the Point of Interconnection (POI) via a 230/34.5kV grounded wye/ delta main transformer with a rating of 70/93/117 MVA. The AC1-216 POI will be at a new ringbus bay in switching station to be built for the AB2-134 queue project that connects on the Hopewell - Surry 230kV line # 212.

5. Description of Facilities Included in the Facilities Study

The project will add a 230 kV bay in the new ringbus bay in switching station to be built for the AB2-134 (Colonial Trail substation) queue project and build a short 230 kV transmission line to connect the generation to the ring bus. The ITO will build and own one span of the transmission line between the new Colonial Trail substation backbone and a new structure outside the fence. A line switch will be installed just outside of the new Colonial Trail substation. Metering equipment, including metering accuracy CT's and metering accuracy CCVT's, will be installed just before the line switches. The developer collector station will be located on the property adjoining the Dominion Substation. The developer will bring the bus from the adjutant collector station to the line switches over the fence.

The substation general arrangement drawing (Attachment 2) was developed by the ITO during PJM's Generation Queue Process. The single line is shown in Attachment 1.

6. Total Costs of Transmission Owner Facilities included in Facilities Study

Work Description	Direct		Indirect		Total Cost
	Labor	Material	Labor	Material	
Attachment Facilities	$305,134	$227,652	$51,311	$27,290	$611,387
Total Attachment Facilities Cost					
Colonial Trail 230kV substation expansion (n5826)	$271,787	$208,575	$114,700	$24,905	$619,967
Total Network Upgrades	$305,134	$227,652	$51,311	$27,290	$611,387
Total Project Costs	$576,921	$436,227	$166,011	$52,195	$1,231,354

7. Summary of Milestone Schedules for Completion of Work Included in Facilities Study:

Facilities are estimated to take 4 - 8months to construct and this is based on the ability to obtain outages to construct and test the proposed facilities.

Proposed Schedule

- Detailed design 2 – 4 months
- Construction 2 – 4 months

B. Transmission Owner Facilities Study Results

1. Attachment Facilities

The Attachment Facilities include that portion of the interconnecting switching station which is associated solely with the single feed to the generating facilities. The project's Attachment Facilities include some 230 KV bus work required to create the new line position and one span of 230 kV transmission line from the substation to a structure outside the substation. Metering equipment, including metering accuracy CT's and metering accuracy CCVT's, will be installed in the Colonial Trail substation. The equipment associated with the Attachment Facilities includes the following:

Note: Currently, the scope and estimate assumes DVP standard spread footer foundations. Once the soil information is received and if it is decided to change that to "pile foundations" then DVP team should be informed at the earliest to adjust the project estimate.

Purchase and install substation and line material:

Purchase and install substation material at Colonial Trail substation:

1. One (1), 230kV, 3000A center break switch
2. Three (3), 230kV metering accuracy CCVT's
3. Three (3), 230kV metering accuracy CT's

4. Three (3), 180 kV, station class arresters
5. Conductors, connectors, conduits, control cables, foundations, steel structures and grounding.

Purchase and install relay material at the Colonial Trail substation:

1. One (1), 1109 – 28" Dual SEL-587Z Transmission Bus Panel
2. One (1), 4200 – Bus Differential C.T. M.U. Box.
3. One (1), 1425 – Dual SEL-735 Transmission & G. I. Metering
4. One (1), 4524 – Revenue Metering C.T. M.U. Box
5. One (1), 4506 – 3 phase CCVT Potential M.U. Box
6. One (1), 1323 – Dual SEL-487E/735 PMU & PQ
7. One (1), Customer Interface Box

2. Transmission Line – Upgrades

None

3. New Substation/Switchyard Facilities

None

4. Upgrades to Substation / Switchyard Facilities

PJM Network Upgrade #n5826 – Expand Colonial Trail 230kV substation. Expand the ringbus by adding a 230 kV circuit breaker at the Colonial Trail substation. Costs include the following:

Note: Currently, the scope and estimate assumes DVP standard spread footer foundations. Once the soil information is received and if it is decided to change that to "pile foundations" then DVP team should be informed at the earliest to adjust the project estimate.

Purchase and install substation material at the Colonial Trail substation:

1. One (1), 230 kV, 3000A, 50kAIC, SF-6 circuit breaker.
2. One (2), 230 kV, 3000A, center break switches.
3. Install any conductor, connectors, conduit, control cable, structural steel, foundations and grounding material as necessary per Dominion Substation Engineering Standards.

Purchase and install relay material at Colonial Trail Substation:

1. Two (2), 1510 – 24" Dual SEL-351 transmission breaker w/ reclosing panel
2. Two (2), 4510 - SEL-2411 breaker annunciator
3. Two (2), 4526_A – circuit breaker fiber optic M.U. box

5. Metering & Communications

PJM Requirements

The IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O Appendix 2.

ITO Requirements

Metering and SCADA/Communication equipment must meet the requirements outlined in section 3.1.6 Metering and Telecommunications of ITO's Facility Interconnection Connection Requirement NERC Standard FAC-001 which is publically available at www.dom.com.

At the IC's expense, the ITO will supply and own at the Point of Interconnection bi-directional revenue metering equipment that will provide the following data:

a. Hourly compensated MWh received from the Customer Facility to the ITO;
b. Hourly compensated MVARh received from the Customer Facility to the ITO;
c. Hourly compensated MWh delivered from the ITO to the Customer Facility; and
d. Hourly compensated MVARh delivered from the ITO to the Customer Facility.

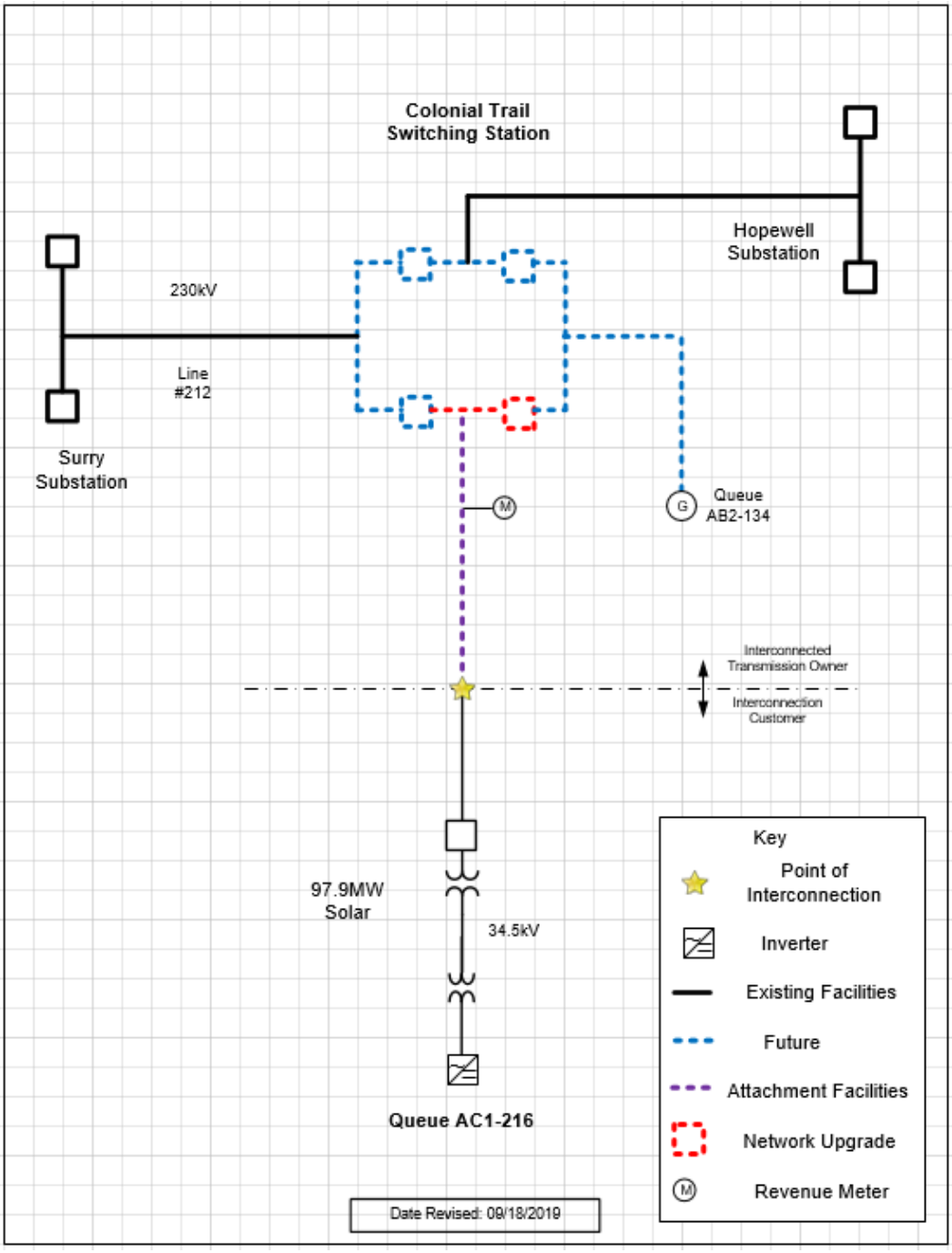
The IC will supply and own metering equipment that will provide Instantaneous net MW and MVar per unit values in accordance with PJM Manuals M-01 and M-14D, and Sections 8.1 through 8.5 of Appendix 2 to the ISA;

The IC will access revenue meter via wireless transceivers or fiber cabling to meter with RS-485 or Ethernet communication port for dial-up reads. IC must provide revenue and real time data to PJM from Interconnection Customer Market Operations Center per "PJM Telemetry Data Exchange Summary" document available at PJM.com.

6. Environmental, Real Estate and Permitting Issues

The project will require permitting for the transmission line construction as well as the substation work. The actual permits required for the project will not be known until the permitting team engages with the local and state agencies upon execution of the ISA.

Attachment 1.
Single Line



Attachment 2.

AC1-216 Colonial Trail 230kV Substation General Arrangement